

Publication Number: JP10-022601A

Date of publication of application: January 23, 1998

Application Number: JP08-174583

Date of filing: July 04, 1996

Applicant: HITACHI LTD

[Title Of The Invention]

CONNECTION STRUCTURE FOR INPUT/OUTPUT PIN

[Abstract]

PROBLEM TO BE SOLVED: To provide a connection structure for an input/output pin, in which the stress generated at connection time is reduced, especially at the connection end of a pin connection member, to connect an input/output pin to a board of low strength.

SOLUTION: A conductive metal 5 where a pad connection member 8 is made is put between the connection pad 3 on a board 4 and an input/output pin 6, with its pad connection member 8 directed toward the board 4, and the input/output pin 6 and the conductive metal 5, by a pin connecting member 7, and the connection pad 3 and the conductive metal 5, by a pad connecting member 8, are connected with each other. The conductive metal 5 has such a size that it can fulfill indispensable minimum electric property, and that the connection end of the pin connecting member 7 is not connected directly to the connection pad 3, thus the direct connection to the connection pad 3 of the pin connecting member 7 can be prevented by fixing the conductive metal 5 into a sheet-shaped insulator.

[Claim(s)]

[Claim 1] In a substrate with an output pin which connected an output pin to a connection pad on a high density wiring board of an electronic circuit electrically and mechanically, Electric conduction metal which has a connection area for an electrical property required at least between said connection pad and said output pin to be acquired and the area more than equivalent is inserted, A pin connection member used by connection between said output pin and said electric conduction metal, At the best, directly, said not all pin connection members connect with said connection pad of said substrate at worst, but only a connecting end section of said pin connection member for connection between said electric conduction metal and said connection pad. Connection structure of an output pin, wherein said connection pad and said output pin connect electrically and mechanically by connecting using a pad connecting member.

[Claim 2] There is no simple substance in an insulator, after carrying out the multiple anchorage, it is formed in a sheet shaped, or said electric conduction metal is a simple substance thru/or the connection structure of the output pin according to claim 1 where the multiple anchorage is carried out, it is made a sheet, and said sheet can take a flow only in the direction of a rear surface individually with said electric conduction metal, to a sheet shaped insulator.

[Claim 3] Connection structure of the output pin according to claim 1 or 2 where a coefficient of linear expansion of said electric conduction metal is more than said substrate, and a coefficient of linear expansion goes into a range below a connection pad of said substrate.

[Claim 4] Only in a position surrounded by said electric conduction metal in a portion surrounded on a pinhead periphery of said output pin, and a position to which said pinhead in said connection pad corresponds. Claim 1 whose sum total effective area product of said

breakthrough a simple substance or two or more breakthroughs are opened in said electric conduction metal, and is below said pinhead area, or connection structure of an output pin given in 2 or 3.

[Claim 5] Connection structure of the output pin according to claim 1, 2, 3, or 4 which connects concurrently said input output pad, said conductive metal, and said connection pad in a manufacturing process.

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the substrate which inserted electric conduction metal between the substrate and the output pin, and was connected to high density wiring boards, such as an electronic circuit, in the substrate with an output pin which connected the output pin electrically and mechanically.

[0002]

[Description of the Prior Art] In common substrates with an output pin, such as PGA (Pin Grid Array), Ag wax was used for high intensity boards, such as alumina, and it has connected with them. If it connects by the same method as a glass ceramic board with comparatively weak intensity, etc., a substrate will break in the stress by contraction of wax material, etc., and connection will stop however, realizing. Like "the substrate with a pin" of JP,61-81659,A, therefore, Au-Sn system wax material, Namely, head shape of an output pin is made into shape with a taper like a cone form like the "connector pin" of JP,63-116379,A in the melting point of wax material itself carrying out reduction of the stress using a low thing, Lower generating stress, respectively, it prevents from breaking a substrate, and connection is materialized.

[0003]

[Problem(s) to be Solved by the Invention] However, by the conventional method, the substrate strength which can bear this stress at worst by the stress which wax material gets wet and is generated at the breadth end, i.e., a connecting end section, serving as a neck was required. Therefore, in order to connect an output pin to a still low strength substrate electrically and mechanically, the reduction of the stress generated at the time of connection, especially the reduction of the stress generated in a connecting end section are required.

[0004]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, electric conduction metal which has a connection area from which an electrical property required between an output pin and a substrate is acquired, and a size more than equivalent is inserted, and a connecting end section of a pin connection member which connects an output pin was kept from connecting with a direct continuation pad in this invention. After there is no simple substance in a simple substance thru/or multiple anchorage, or an insulator and carrying out the multiple anchorage of the electric conduction metal to a sheet shaped insulator so that connection might be realized in any positions in order to carry out alignment of the electric conduction metal to a connection pad of a substrate correctly and simple and, it formed in a sheet shaped. More than a substrate made a coefficient of linear expansion of electric conduction metal into a range below a connection pad. A breakthrough below pinhead area is opened in a position directly under a pinhead in total, and positive connection between an output pin and a connection pad was obtained by electric conduction metal because only a small area carries out direct

continuation of a part of pin connection member to a connection pad of a substrate. A connecting end section of a pin connection member is not connected to a connection pad of a direct board by these, Without carrying out direct continuation also of a lot of pin connection members to a connection pad of a substrate except for a part, influence on a substrate of the stress can be reduced, and stress by difference of a coefficient of linear expansion between a substrate and a connection pad can also be reduced, and connection with a low-strength board is attained. A manufacturing process can be shortened by connecting an output pin, electric conduction metal, and a substrate simultaneously.
[0005]

[Embodiment of the Invention]

<Example 1> drawing 1 shows some connection interrupt side figures of a high density wiring board and output pins, such as the target electronic circuit, with the connection structure of the output pin of this invention. Single or two or more alloys, such as the conductor 2 which consists of an alloy single or multiple [, such as the insulating material 1 which consists of glass ceramics, Cu, W, Mo and nickel, and Ti], Cu, W, Mo, nickel, Au, and aluminum, On the substrate 4 which comprised the connection pad 3 which becomes with a composite structure object, it is provided by Cu, W, Mo, Fe, nickel, Au₁₂germanium, covar, etc., The electric conduction metal 5 which forms metal, such as Cu, nickel, and Au, in the surface for Cr and Ti with weld slag, plating, etc. on it further as metallizing and to which it enabled it to connect wax material etc. is inserted, The output pins 6 which are single or consist of a composite structure object of two or more alloys, such as Cu, nickel, Fe, Co, Zr, Au, P, and B, are connected. At this time, in the case of a Cu or nickel system, even if the construction material of the electric conduction metal 5 forms metallizing in the surface, it does not have to carry out. The output pin 6 and the electric conduction metal 5 are the pin connection members 7 which consist of wax material, such as Au₂₀Sn and Au₁₂germanium, The electric conduction metal 5 and the connection pad 3 are connected in small quantities also by the same pin connection member 7 by the pad connecting member 8 formed with the thing used as the thin film, or the alloy single or multiple [, such as Sn, Pb, Ag, and Au,]. And since it is connected with the connection pad 3, it is more desirable to make the pad connecting member 8 into a sheet shaped as thinly as possible, and it may be directly formed in the surface of the electric conduction metal 5 by plating, weld slag, etc. At worst, the connecting end section of the pin connection member 7 adjusts beforehand the size and connecting location of the electric conduction metal 5 so that direct continuation cannot be carried out with the connection pad 3.

[0006]If a coefficient of linear expansion makes it three or less four or more substrate connection pad, the electric conduction metal 5 will reduce the strain by the difference of each coefficient of linear expansion, and its part connection resilience of the will increase. As for the electric conduction metal 5 and the output pin 6, in order to reduce a connection man day, it is desirable to make it connect concurrently. Then, as for the pad connecting member 8, it is preferred that only the portion which connects only the surface and rear surface of the electric conduction metal 5 the connection pad 3 side gives 0.01-1.0 micrometer of Sn to the whole surface by plating or weld slag. If needed, it heat-treats after plating, and the adhesion power of Sn and the electric conduction metal 5 which are the pad connecting members 8 is heightened, or Au is formed in the outermost surface by plating or weld slag, and it may be made to become an Au-Sn system alloy at the time of a surface protection or connection. The direction where Sn which is the pad connecting

member 8 of the electric conduction metal 5 was formed on the connection pad 3 of the substrate 4 in this electric conduction metal 5 is turned to the connection pad 3, and alignment is carried out, and it is placed, and after putting on it the output pin 6 which connected the pin connection member 7 beforehand, it puts in, heats and connects concurrently to a furnace.

[0007]Another example of this invention shows some connection interrupt side figures of a substrate and an output pin to <Example 2> drawing 2. This fixes the electric conduction metal 5 of drawing 1 to a sheet shaped with the insulators 11, such as polyimide, polyamide, and epoxy, or after it makes the insulator 11 a sheet shaped previously, it fixes the electric conduction metal 5, and it is using it as the sheet 12. In that case, it has the structure where only the portion to which there is no insulator 11 in the surface and rear surface of the electric conduction metal 5, therefore the electric conduction metal 5 is in the direction of a rear surface of the sheet 12 can take a flow. And if it fixes to the connection pad 3 of the substrate 4, and the corresponding position when the electric conduction metal 5 is fixed to a sheet shaped, the alignment of the substrate 4 and the output pin 6 will become easy and exact. If the insulator 11 is previously made into the sheet shaped, a breakthrough is opened in the connection pad 3 of the substrate 4, and a corresponding position and the electric conduction metal 5 is formed by weld slag, plating, printing, etc. into the hole, when especially the thickness of the electric conduction metal 5 is thin, work of electric conduction metal and handling will become easy. If it fixes with the substrate 1 with a binder etc., connection and substrate reliability will improve, but if there are adhesion strength of the insulator 11 and the electric conduction metal 5 and connection resilience of enough of the electric conduction metal 5 and the connection pad 3, it is not necessary to fix the insulator 11 in particular.

[0008]Another example of this invention shows some connection interrupt side figures of a substrate and an output pin to <Example 3> drawing 3. Compared with Example 2, as for this, the electric conduction metal 5 is extremely small, and the electric conduction metal 5 is contained also in the part and a portion also without necessity. Naturally electrical properties, such as insulation resistance, are but designed by this. By using the sheet 12, the alignment of the sheet 12 like [at the time of Example 2] becomes unnecessary, and a connection process becomes simple.

[0009]Another example of this invention shows some connection interrupt side figures of a substrate and an output pin to <Example 4> drawing 4. This is the same except [all] the electric conduction metal 5 of a portion which hits between the periphery of the pinhead 10 of the output pin 6 and the connection pad 3 compared with Example 1, 2, and 3 having the hole 9. As a result, the pin connection member 7 can connect only a part now with the connection pad 3 directly. However, the opening diameters of the hole 9 are a diameter of the pinhead 10, and below equivalent, and a position is only directly under the pinhead 10. As long as it fulfills this condition, plural may be sufficient as the hole 9. Since the portion of the pin connection member 7 which did not connect to the direct continuation pad 3 by this the connecting end section where the stress by pin connection member 7 reason is big, but was slightly connected with the direct continuation pad is restrained by the pinhead 10, stress becomes small and it does not become a problem. These electric conduction metal 5 may be fixed to the insulator 11, and it may be made a sheet shaped, or these electric conduction metal 5 may be fixed to the sheet shaped insulator 11, and it may carry out like Examples 2 and 3.

[0010] Another example of this invention shows some connection interrupt side figures of a substrate and an output pin to <Example 5> drawing 5 and drawing 6. These are the same except [all] the shape of the electric conduction metal 5 differing compared with Examples 1, 2, 3, and 4. If such shape is used, the connection area of the output pin 6 and the electric conduction metal 5 increases, and it can connect more powerfully. A breakthrough like Example 4 may be opened in these electric conduction metal 5, or it may fix with the insulator 11, and may be made a sheet shaped, or these electric conduction metal 5 may be fixed to the sheet shaped insulator 11, and it may carry out like Examples 2 and 3.

[0011]

[Effect of the Invention] In this invention, electric conduction metal is inserted between a substrate and an output pin, and connection of an output pin with a low-strength board can be performed by making it the structure which the connecting end section of the pin connection member which connects electric conduction metal with an output pin does not connect with a direct continuation pad.

[Brief Description of the Drawings]

[Drawing 1] The sectional view of connection of a high density wiring board and an output pin of the target electronic circuit in the connection structure of the output pin of one example of this invention, etc.

[Drawing 2] The explanatory view which fixed electric conduction metal to the sheet shaped insulator with the connection structure of the output pin of the second example of this invention.

[Drawing 3] Another explanatory view which fixed electric conduction metal to the sheet shaped insulator with the connection structure of the output pin of the third example of this invention.

[Drawing 4] The explanatory view which changed the shape of electric conduction metal with the connection structure of the output pin of the second example of this invention.

[Drawing 5] The explanatory view which changed the shape of electric conduction metal with the connection structure of the output pin of the third example of this invention.

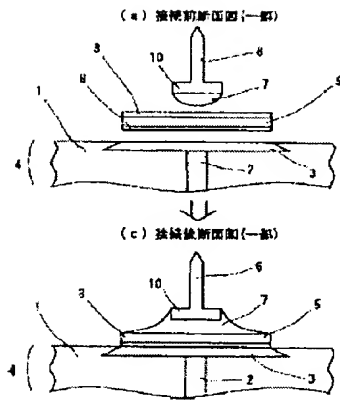
[Drawing 6] The explanatory view which changed the shape of electric conduction metal with the connection structure of the output pin of the fourth example of this invention.

[Description of Notations]

- 1 -- Insulating material,
- 2 -- Conductor,
- 3 -- Connection pad
- 4 -- Substrate,
- 5 -- Electric conduction metal,
- 6 -- Output pin
- 7 -- Pin connection member,
- 8 -- Pad connecting member,
- 9 -- Hole,
- 10 -- Pinhead.

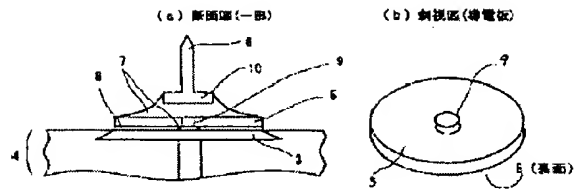
【図1】

図1



【図1】

図4



【図2】

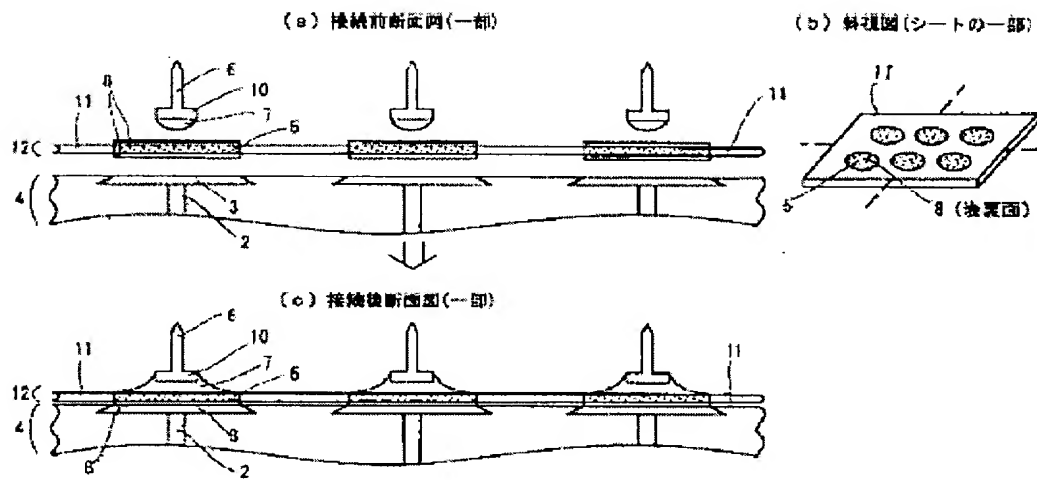


図2

【図3】

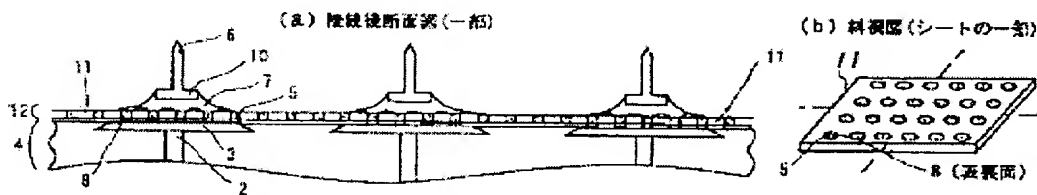
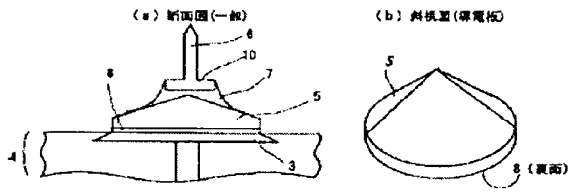


図3

【図5】

図5



【図6】

図6

